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V-class I

1.) cari representasi integral fourier dari fungsi $f(x) = 2$ jika $|x| < 2$ dan $f(0)$ jika $|x| > 2$?

$$f(x) = 2 \;,\; |x| < 2$$
$$f(x) = 0 \;,\; |x| > 2$$

$$A(a) = \frac{1}{\pi} \int_{-\infty}^{\infty} f(x) \cos ax \, dx$$

$$= \frac{1}{\pi} \left[\int_{-\infty}^{-2} 0 \cos ax \, dx + \int_{-2}^{2} 2 \cos ax \, dx + \int_{2}^{\infty} 0 \cos ax\,dx \right]$$

$$= \frac{1}{\pi} \left[\int_{-2}^{2} (2) \cos ax \, dx \right] = \frac{2}{\pi} \int_{-2}^{2} \cos ax \, dx =$$

$$= \frac{2}{\pi} \left[\frac{\sin ax}{a} \right]_{-2}^{2}$$

$$= \frac{2}{\pi} \left[\frac{\sin 2a}{a} - \frac{\sin -2a}{a} \right] = \frac{2}{\pi} \left[\frac{\sin 2a - \sin -2a}{a} \right]$$

$$= \frac{2}{\pi} \left[\frac{2 \sin 2a}{a} \right] = \frac{4 \sin 2a}{\pi a}$$

$$B(a) = 0$$

$$f(x) = \int_0^{\infty} \{ A(a) \cos ax + B(a) \sin ax \} \, dx$$

$$f(x) = \int_0^{\infty} \left\{ \frac{4 \sin 2a}{\pi a} \cos ax + 0 \right\} dx$$

$$= \frac{4}{\pi} \int_0^{\infty} \frac{\sin 2a x \cos ax \, dx}{a}$$

2) Tentukan representasi integral cosinus fourier dan integral sinus fourier fungsi $f(x)=1$ jika $0<x<1$ dan $f(x)=0$ jika $x>1$?

$f(x)=1 \quad 0<x<1$

$f(x)=0 \quad x>1$

cos

$B(a)=0$

$A(a)=\frac{1}{\pi}\left(\int_{-\infty}^{\infty} f(x)\cos ax\, dx\right)$

$=\frac{1}{\pi}\left(\int_{-\infty}^{0} 0\cos ax\,dx + \int_{0}^{1} 1\cos ax\,dx + \int_{1}^{\infty} 0\cos ax\,dx\right)$

$=\frac{1}{\pi}\int_{0}^{1}\cos ax\,dx = \frac{1}{\pi}\left[\frac{\sin ax}{a}\right]_0^1 = \frac{1}{\pi}\left[\frac{\sin a}{a}-\frac{\sin a0}{a}\right] = \frac{1}{\pi}\frac{\sin a}{a}$

sin

$A(a)=0$

$B(a)=\frac{1}{\pi}\left(\int_{-\infty}^{\infty} f(x)\sin ax\,dx\right) = \frac{1}{\pi}\left[\int_{-\infty}^{0} 0\sin ax\,dx + \int_{0}^{1} 1\sin ax\,dx + \int_{1}^{\infty} 0\sin ax\,dx\right]$

$=\frac{1}{\pi}\int_{0}^{1}\sin ax\,dx = \frac{1}{\pi}\left[\frac{-\cos ax}{a}\right]_0^1 = \frac{1}{\pi}\left(\frac{-\cos a}{a}-\frac{-\cos a0}{a}\right)$

$=\frac{1}{\pi}\left(\frac{-\cos a}{a}+\frac{1}{a}\right)$

$=\frac{1}{\pi}\frac{1-\cos a}{a}$